was emphatically wanted was a history and discussion of details to give shape and fulness to the more meagre accounts found elsewhere. Doubtless many will say that the work contains a great deal more than can possibly be wanted by the student of medicine or even of physiology. We will not presume to answer the difficult question, How little physiology a medical student may know without his educational status being considered "mean"; but this we may say, that there is not a page in this work, the study of which will not prove profitable not only to the medical student, but even to the medical practitioner.

We trust that the author will as soon as possible be able to complete a work of which the first part will increase his already high reputation, and certainly must be regarded as a most noteworthy addition to English physiological literature. M. FOSTER

PEAT-MOSSES

The Sphagnaceæ or Peat-Mosses of Europe and North America. By R. Braithwaite, M.D., F.L.S. (London: David Bogue, 1880.)

THE peat-mosses are a peculiarly interesting group of cryptogamic plants, which has attracted the attention of even ordinary observers from a very early period. No group of plants is more clearly defined in structure, in family likeness, and by the localities in which they are found. The wanderer over our moorlands, the sportsman in pursuit of game, are as familiar as is the botanist with their dense green or ruddy-coloured tufts, now covering over some damp spot or filling up some bog hole with a vast mass of vigorous vegetation. Nor is there wanting to them an economic value, and that of too great an importance to be overlooked by even the most careless, for it is past generations of these bog-mosses which form the vast deposits of peat, for which as an article of fuel no substitute is in many parts of Europe attainable. The name sphagnus was first used, by writers like Theophrastus and Pliny, to indicate some of the spongy lichens, but was restricted to a genus of mosses by Dillenius more than a century and a half ago, "which were like none of the terrestrial mosses, but were produced always in bogs and marshes."

Dr. Braithwaite, in the volume before us, gives a most excellent sketch of the literature of the genus, tracing it from Dillenius, Linneus, Hedwig, to Müller, Wilson, Sullivant, Schimper, Lindberg, and others. For a long time Prof. Schimper's work was the best on the subject, and Dr. Braithwaite mentions it as very complete in its details of structure, both descriptive and pictorial, and as leaving hardly anything to be desired. Of works more especially relating to the development and minute anatomy of the group, allusion is made to the important memoirs of von Mohl, Carl Nägeli, Dozy, Hofmeister, Russow, Piré, and Rozé. He then proceeds in a second chapter to some general observations on collecting, preparing, and on the points to be observed in the determination of a species.

In a third chapter the vegetative system of the group is discussed. To our mind this chapter might well have been extended. The details given of the germination of the spores are too few, nor is the following chapter on the reproductive system free from the same defect; and as to the illustration of these two chapters, it will suffice to mention that it is confined to a single plate. As the charming plates illustrating the descriptive portion of the work are, we trust, likely to serve for more than one edition of it, we would suggest that, in the event of a second edition, some half-dozen supplementary plates might be given, on which would be represented the embryology of the group.

Between fifty and sixty species of Sphagnum are known, of which about one-third are tropical. They are most abundant in the north and south temperate zones, in the higher latitudes of which they often cover over a large expanse of surface. Dr. Braithwaite describes twenty species as found in Europe and North America, that is about one-third of all the known species. Of the others, seven species are described as from Brazil, seven from Central America, four from Guadaloupe, seven from Australia and New Zealand, four from the Eastern Archipelago, two of these, *S. sericeum*, C. Müll., and *S. Holleanum*, Dozy and Molk, known only in a barren state, but remarkable for having the stem leaves precisely like the branch leaves in form and structure, their hyaline cells being without fibres, but with a single apical pore. The only species from tropical Africa is *S. Africanum*, Duby.

Dr. Braithwaite points out that the range of variability in the species is in this group most extensive, so that in their determination one must rely on minute anatomical distinction for their essential characters, as in many cases size, colour, direction of leaves, habit, presence or absence of fibres in the hyaline cells of the stem leaves, will all alike fail. In the separation of the Sphagninæ as a subclass from the Bryinæ or frondose mosses, Dr. Braithwaite follows the earlier views of the illustrious Schimper. He groups the species described in nearly the same manner as Lindberg, adopting his three sections—Eusphagnum, Hemitheca, and Isocladus. The European species are all located in the first section. The descriptive details are very clearly given. The synonymic lists are evidently made out with great care, and the varieties which in many of the species are, as is well known, very marked, are not only described, but in several cases figured. The twenty-eight beautiful coloured plates illustrating the species and varieties are all from drawings by the author, and they contain complete anatomical details of the stem and leaf structures. The work is brought out in a style worthy of the subject, and we trust will find its way not only into the hands of the botanist, but, as it well deserves to do, into the possession of all who take an intelligent pleasure in studying our native mosses.

OUR BOOK SHELF

Vox Populi: a Sequel to the "Philosophy of Voice." By Charles Lunn. (London: W. Reeves, 1880.)

WE are told in the preface that "the present work is a reprint of articles that appeared in the *Orchestra*," and that "now it has been discovered Galen (A.D. 180), 'the father of physicians,' as he is called, advanced the same physical views as those for which I (Mr. Lunn) have contended, my controversial work is ended:—it is scarce worth while to re-write." Was it then worth while to re-print? In the introduction the author tells us that his articles were written "to clear up some ambiguous points in my (Mr. Lunn's) 'Philosophy of Voice,'" and that "this without the former work is incomplete, as that

without this." Some time ago the present writer honestly endeavoured to understand Mr. Lunn's "Philosophy of Voice," and utterly failed in his attempts. He cannot find any assistance towards understanding it in the present little tract (pp. 88) of loose writing, wonderful reasoning, and jumping exposition. Let us hope that Mr. Lunn's teaching is better than his preaching. His axioms are however rather startling, especially the second (p. 7), "All voices are naturally beautiful. All ugliness in vocal tone is the result of transferred habits acquired by the artificial use of voice in speech." If this use is "artificial," what use is "natural"? But attempts to understand and criticism are all thrown away. Notwithstanding Mr. Lunn's initial confession that he is a mere follower of Galen, he declares in his introduction (p. 1): "It is a *fait accompli*. *I* have founded a New Profession standing midway between the Musical and the Medical worlds, with Art on its one side, Science on the other; firm and irrefutable." In this state of suspension, like Mahomet's coffin, "midway between" two "worlds," and belonging to neither Science nor Art, which seems fitly to describe the nature of the book, we are content to leave it to the happy conviction of the author that what he says (of course when others can find out what it is) is "firm and irrefutable."

Practical Plane Geometry and Projection for Science Classes, Schools, and Colleges. By Henry Angel. Vol. I., Text; Vol. II., Plates. Collins's Advanced Science Series. (London and Glasgow, 1880.)

A VERY practical and useful book by an experienced teacher: it is designed to meet the requirements of students at the Royal School of Mines, at the Royal Military Academy, at Cooper's Hill, and elsewhere, and embraces great part of the two higher stages of the Science and Art Department syllabus. There is no great scope for absolute novelty in such a work, and our author acknowledges his indebtedness to the works of many, if not most, of his well-known predecessors, but the arrangement appears to be judicious, and the constructions good and clearly enunciated. In the Practical Geometry (six chapters) the student is taught the use and construction of scales, of triangles and polygons, and there are numerous problems on areas, on circles in contact, and on other plane curves with their tangents and normals. The orthographical portion treats of the projection of the five regular solids, of other simple solids, of flat and curved surfaces, intersected by cutting planes, and of solids inscribed in, or circumscribed to, the surfaces of other solids; of the interpenetration of solids, of the projection of shadows, on isometric projection, on the solution of the spherical triangle, and on horizontal projection—a very extensive and varied bill of fare. In addition there are numerous questions for practice, many of which are taken from examination papers, and the text is illustrated by several clearly-drawn figures. Part ii. contains eighty-one large-page plates to further illustrate the constructions. The two parts together ought to enable any painstaking student to take a creditable place in his examination and to acquire a solid acquaintance with the subject.

Teorica delle Forze Newtoniane e sui applicazioni all' Elettrostattica e al Magnetismo del Prof. Enrico Betti. 365 pp. (Pisa, 1879.)

IN the session 1863-64 Prof. Betti delivered at Pisa a course of lectures, subsequently (1865) printed in the *Nuovo Cimento* under the title "La Teorica delle Forze che agiscono secondo la legge di Newton e sua applicazione alla elettricità statica"; the volume before us is what may be looked upon as its greatly enlarged second edition. It consists of an introduction and three chapters. The first chapter, in twenty-three sections, treats of Potential Functions and of Potentials (§ 11 gives Green's theorem and some others due to Gauss; § 12 Stokes's theorem for transforming a double integral into a simple integral, and the properties of a surface which has on one face a stratum of attracting, and on the opposite face an equal stratum of repulsive, matter; the other sections appear to contain nearly all the known properties of these functions). Chapter II., on Electrostatics, in sixteen sections, discusses several cases of electrostatical distribution, the method of images (Sir W. Thomson's theory) and condensers; Chapter III., on Magnetism, is divided into ten sections (on p. 304 Prof. Betti announces the theorem, "Se la superficie di un corpo è semplicemente connessa ed ha un numero finito di poli, questo numero sarà sempre pari," an advance upon Gauss, who has shown that if there be three poles there must also be a fourth).

Kalkül der Abzählenden Geometrie. Von Dr. Hermann Schubert. (Leipzig: Teubner, 1879.)

DR. SCHUBERT in this work gives us, in the form of a treatise of 359 pages, the principal results as yet arrived at in the "Numerical Geometry," a branch of mathematics originated by M. Chasles and subsequently studied by Zeuthen, Sturm, Halphen, Klein, and in this country by Dr. Hirst ("On the Correlation of Two Planes," vol. v.; "Correlation in Space," vol. vi.; "Note on the Correlation of Two Planes," vol. viii.; London Math. Soc. *Proceedings*). The book closes with a full historical and bibliographical list in the form of notes to the several chapters.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

[*The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.*]

The Spectrum of Hartwig's Comet

THE spectrum of this comet was examined here on the evening of October 7 with a spectroscope having a single prism of 45°, and was found to consist of three bright bands and a continuous spectrum corresponding to the nucleus. The middle and brightest band was compared with the band at W.L. 5198 in the spectrum of a vacuum tube containing alcohol vapour, and three micrometer measures gave the position of the less refrangible edge of the comet band at W.L. 5184, 5215, and 5204 tenth metres respectively. The breadth of the band was about 40 tenth metres. These measures would indicate that the principal comet-band is coincident with the band at W.L. 5198 of the vacuum-tube spectrum of carbon-compounds, and not with that of the Bunsen-flame at W.L. 5165. The observations however were made under unfavourable circumstances, the comet being low, and involved in haze and cloud. The positions of the other two bands were not determined. W. H. M. CHRISTIE

Royal Observatory, Greenwich, October 11

Wire Torsion

I HOPE you will allow me to seek information, through your aid, on a subject which is perplexing me a good deal at present. I am engaged in studying a gravimeter designed by the late J. Allan Broun, in which gravity is balanced by the torsion of a single wire; or is intended to be so. As the function of the instrument depends largely on the law of torsion in wires, I have been making experiments to satisfy myself on some points. It is in the results of one of these that I have met with my difficulty. I was using thin brass wire (diam ·02), and after stretching it till it broke, twice, I supposed it to be at or near its maximum elasticity, and proceeded to use it in the intended way. At each end of a 6-foot plank I inserted into the edge a 2-inch screw. The wire was fastened upon these so as to get a strain by turning them. The wire was in two pieces, attached to opposite sides of a ring in the middle. By turning this ring the two wires were